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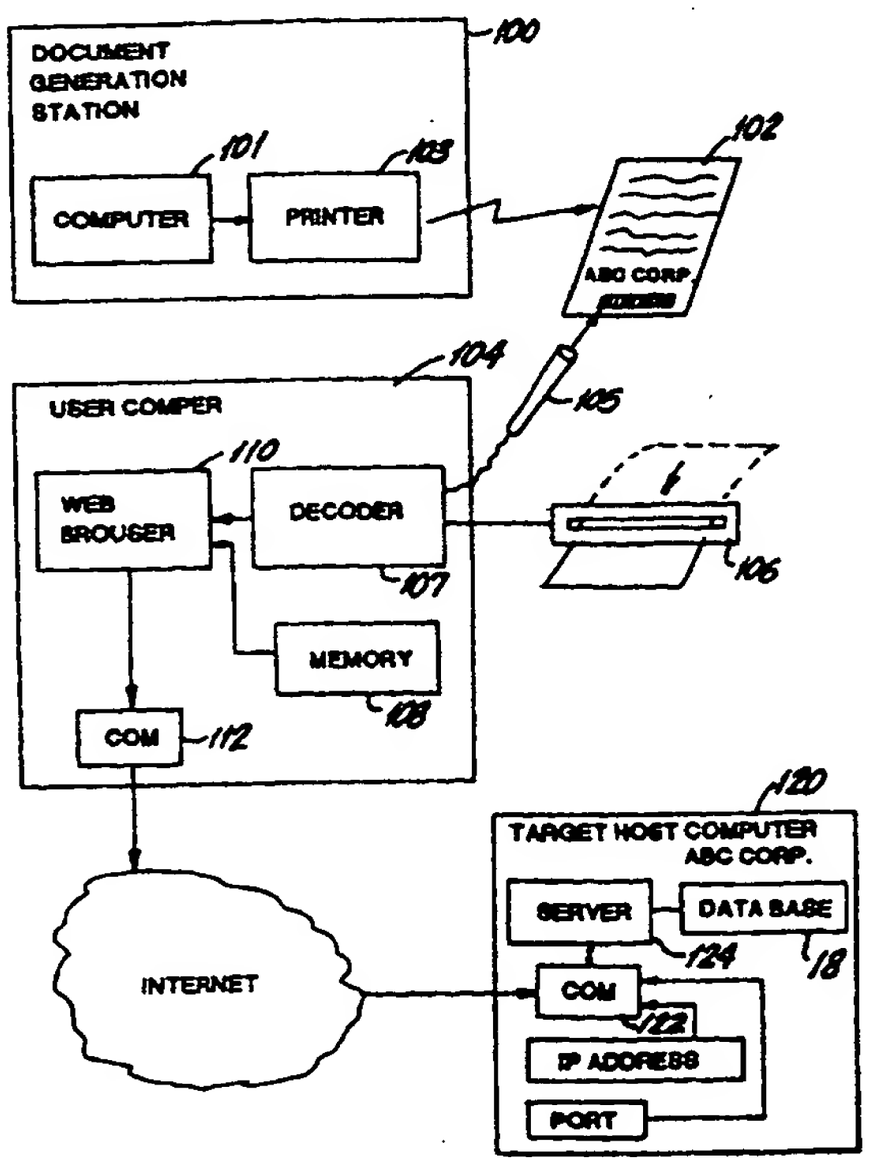
(57) Abstract

The present invention provides a method for encoding a host Internet Protocol (IP) address within a linear (i.e. one dimensional) barcode which enables a direct link to a designated host computer without third party intervention. Additional information may be made available to the designated host or other parties directly or through a commercial server which include but are not limited to client demographics and usage, and data regarding the publication within which the barcode was discovered by the client. The present invention also contemplates a method which restricts access to only those server addresses which exhibit authorized and licensed codes validated and analyzed by a process resident on the client computer. The present invention pertains to both "open" and "closed" Internet implementations such as TCP/IP and client/server environments (e.g. World Wide Web and html). The invention may be adapted to a wide variety of software and hardware applications available to the typical client such as personal computers equipped with appropriate communications and session software, workstations, dedicated network computers, handheld terminals, and web–ready television.



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AUTOMATIC SERVER ACCESS IN AN INTERNETWORKED COMPUTER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application is based on and claims the priority of co-pending provisional patent application filed in the United States Patent and Trademark Office on February 13, 1997 and assigned Serial No. 60/037,988.

TECHNICAL FIELD

This invention relates to the Internet, and in particular to a method for encoding a host Internet Protocol (IP) address within a linear (i.e. one dimensional) barcode which enables a direct link to a designated host computer without third party intervention

BACKGROUND ART

Electronic data sources, such as conventional databases, the Internet and the World Wide Web (WWW) are a rich and important means of information retrieval and distribution and, increasingly, electronic commerce. However, there are problems finding the information desired in this increasingly complex and changing network of data sources. Recently introduced Internet "search engines", such as Yahoo, help by allowing a user to search on-line indices of information sources, and even full source text, for relevant key words and phrases related to their topic of interest, but even carefully structured queries by experienced users often results in hundreds and even thousands of possible "hits" which are not sufficiently

specific to preclude further manual search which is both data resource inefficient and time consuming.

Because of these inefficiencies, as well as general lack of familiarity with search engines and their syntax, users are often rely on human readable print and broadcast media advertising to identify source addresses (e.g., Uniform Resource Locators ("URLs")) for web sites and other online information of interest. Print media is particularly effective since: (1) it is the most ubiquitous method of communication and advertising in the modern world; and (2) a printed document can serve as a persistent reference to be saved and used during a subsequent on-line session or sessions.

However, human readable printed source addresses, and especially URL's, are particularly difficult to manually enter in software programs, such as "web browsers", due to their length and use of complex and unfamiliar symbols. If the characters in an address are not entered exactly, retrieval is prevented or, in a limited number of cases, a legal but incorrect source is accessed. This is especially true when URLs incorporate foreign languages and/or complex query instructions to on-line databases, as is increasingly frequent in most web sites. In addition, the inability to type or otherwise manually enter symbolic address information due to either disability or lack of training complicates use of on-line information resources such as the Internet and World Wide Web for millions of individuals.

Finally, it is widely anticipated that Internet and WWW access will increasingly be provided through interactive cable television via web-ready television receivers and set-top boxes used in conjunction with conventional television receivers. In this home "entertainment" environment, it is difficult to use keyboards for address entry due to both lack of typing skill and the cumbersome placement of these components. Another method which would eliminate typing and allow users to directly link printed addresses and query scripts to electronic information sources would be highly desirable.

Information is currently distributed in print (i.e. hardcopy) and electronic means (i.e. softcopy). While both methods originate from computers each provides a different set of advantages as well as shortcomings.

Printed documents continue to provide the most ubiquitous media and in fact the primary basis for legal, commercial, and educational applications. However, the use of electronic media is expanding rapidly in the fields of multimedia and interactive applications. Printed documents are subject to inaccuracies created by the loss of synchronization with the original source of data. In addition, when compared with multimedia and interactive applications, printed matter is somewhat limited in its ability to provide an effective means of presentation to the potential reader. Conversely, information in electronic format is often not readily available and requires computer mediation.

Therefore, in order to overcome the disadvantages of either source of information while enhancing each of their inherent advantages it would be highly beneficial to be able to link printed documents to electronic resources. This is not intended as a limitation to on-line and Internet resources, since printed documents could also be linked to storage on local media within a local or distributed system.

By linking the two forms of information printed material could be augmented, enhanced and verified through electronic resources. Another benefit to be derived is found in expediting the efficient retrieval of data. The value of this benefit is shown in the widespread acceptance of WWW addresses which have been incorporated into printed documents.

As discussed above entry of WWW addresses is often cumbersome since exact human data entry of complex and unfamiliar strings of text is often required. Also, commercial enterprises are excluded from obtaining valuable demographics concerning those consumers seeking information at the commercial Internet address or for that matter the printed matter which provided the Internet address to the consumer.

One potential solution to this problem is to render the URL address in the form of a machine readable code such as barcodes (linear or two dimensional) or via Optical Character Recognition (OCR) techniques. The barcode could

be scanned with a dedicated or general purpose device equipped to decode the URL address and link the user to the correct URL address using appropriate applications software. However, the disadvantages of these method are that OCR techniques are not reliable for decoding all characters in the various fonts found in printed material. In addition, although two dimensional barcodes are capable of encoding lengthy strings of information, cost effective hardware and software for decoding two dimensional barcodes are not readily available at this time. Also, conventional linear barcodes have insufficient capacity to render character based URL addresses in a practical manner within an efficient amount of space.

Therefore, there is a need for a method which links printed material with electronic resources that is capable of providing access to the link via readily available and cost effective hardware and software.

DISCLOSURE OF THE INVENTION

The present invention provides a method for encoding a host Internet Protocol (IP) address within a linear (i.e. one dimensional) barcode which enables a direct link to a designated host computer via the Internet without third party intervention. Additional information may be made available to the designated host or other parties directly or through a commercial server which include but are not limited to client demographics and usage, and data regarding the publication from which the bar code was discovered by the client. The present invention also contemplates a

method which restricts access to only those server addresses which exhibit authorized and licensed codes validated and analyzed by a process resident on the client computer. The present invention pertains to both "open" and "closed" Internet and Intranet implementations such as TCP/IP and client/server environments (e.g. World Wide Web and html). The invention may be adapted to a wide variety of software and hardware applications available to the typical client such as personal computers equipped with appropriate communications and session software, workstations, dedicated network computers, handheld terminals, and web-ready television.

In particular, the present invention provides a method for automatically linking a client or user computer with a target server or host computer for data transmission therebetween, said method comprising the steps of:

a) assembling a data string comprising a network address of the target server computer and a target file index pointer;

b) encrypting the data string utilizing an encryption key;

c) generating a printed document comprising a machine readable symbol, the machine readable symbol comprising said encrypted data string;

d) scanning the machine readable symbol with scanning means coupled with the client computer to produce scanned data;

e) decrypting the scanned data with a key stored on said client computer and associated with the encryption key;

f) processing the decrypted data to decode the target server computer network address and target file pointer;

g) assembling a data message for transmission over the computer network, the data message comprising the target file pointer and user-specific data from a memory associated with the client computer, the data message being prepended with the target server computer network address in accordance with a transmission protocol associated with the computer network;

h) transmitting the data message over the computer network;

i) receiving the data message at the target server computer;

j) unpacking the data message to determine the target file pointer;

k) retrieving from memory a target file associated with the target file pointer;

i) assembling a return data message for transmission over the computer network, the return data message comprising the target file and being prepended with a computer network address associated with the client computer;

l) transmitting the return data message over the computer network; and

m) receiving the return data message at the client computer.

BRIEF DESCRIPTION OF THE DRAWING

These and other objects and features of the invention shall now be described in relation to the drawings:

Figure 1 is a flowchart illustrating the method of the present invention.

Figure 2 is a block diagram of the system of the present invention.

Figure 3 is an illustration of the data format for encoding into a bar code.

Figure 4 is an alternative block diagram of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

A document 102 embedded with an Internet hot-link bar-code is generated by a document generation station 100 as shown in Figure 2. The document generation station 100 comprises a general purpose computer 101, which may be a personal computer, dedicated printer computer, or the like. Attached thereto in customary fashion is a document printer 103. The general purpose computer 101 is programmed with software that carries out the function to be described herein for generating the embedded document 102, i.e., memory and bar code encoding.

The first step of the process takes place in the document generation station 100 which controls the formatting of a code symbology such as a linear bar code to be printed onto the document 102. Prior to printing the bar

code on the printed document 102, a host Internet Protocol (IP) address related to the target server 124 (the software which runs on the host computer that will be linked by scanning the document) is designated following standard TCP/IP syntax and a specific port is identified in step 1 of Figure 1 if a default port for the host computer 120 has not been assigned. Similarly, process values representing publication information and predetermined responses to be returned by the target server 124 are defined in step 2. Both sets of information are expressed as binary strings in a predefined format in step 3 suitable for later parsing (e.g. data compression). An example of the binary string format is shown in Figure 3.

The following excerpts from the text entitled "Computer Networks and Internets" by Douglas E. Comer are included in order to provide further details regarding the IP address:

> In the TCP/IP protocol stack, addressing is specified by the Internet Protocol (IP). The IP standard specifies that each host is assigned a unique 32-bit number known as the host's Internet Protocol address which is often abbreviated IP address, or Internet address. Each packet sent across the Internet contains the 32-bit IP address of the sender (source) as well as the intended recipient (destination). Thus, to transmit information across a TCP/IP Internet, a computer must know the IP address of the remote computer to which the information is being sent.

Conceptually, each 32-bit IP address is divided into two parts: a prefix and suffix; the two-level hierarchy is designed to make routing efficient. The address prefix identifies the physical network to which the computer is attached, while the suffix identifies an individual computer on that network. That is, each physical network in the Internet is assigned a unique value known as a network number. The network number appears as a prefix in the address of each computer attached to the network. Furthermore, each computer on a given physical network is assigned a unique address suffix. Although no two networks can be assigned the same network number and no two computers on the same network can be assigned the same suffix a suffix value can be used for more than one network. The IP address hierarchy guarantees two important properties:

1. Each computer is assigned a unique address (i.e. a single address is never assigned to more than one computer).

2. Although network number assignments must be coordinated globally, suffixes can be assigned locally without global coordination.

The first property is guaranteed because a full address contains both a prefix and a suffix, which are assigned to ensure uniqueness. If two computers are attached to different physical networks, their addresses have different prefixes. If two computers are attached to the same physical network, their addresses have different suffixes.

Once they chose a size for IP addresses and decided to divide each address into two parts, the designers of IP had to determine how many bits to place in each part. The prefix needs sufficient bits to allow a unique network number to be assigned to each physical network in the Internet. The suffix needs sufficient bits to permit each computer attached to a network to be assigned a unique suffix. No simple choice was possible because adding bits to one part means subtracting bits from the other. Choosing a large prefix accommodates many networks, but limits the size of each network; choosing a large suffix means each physical network can contain many computers, but limits the total number of networks.

Thus, the data to be included in the bar code to be printed in the document 102, as shown in Figure 3, includes the target server IP address in the aa.bb.cc.dd format, the (optional) port number, and data to indicate to the target server 124 which file should be sent back to the user computer 104. For example, if a hot-link bar code is

printed on a stock prospectus for ABC Corporation, then the server file ID might point to a file on the server that will return data relevant to the financial position of ABC Corporation. Similarly, a hot-link bar code for ABC Corporation that is printed as a product brochure might return a file related to the specification of that product.

Optionally, the server file ID field may be omitted, which will allow a smaller bar code symbol to be utilized. In this case, the target server computer will return a file found at a default location.

The resulting binary string or token is then encrypted, obfuscated (rendered obscure through a cipher or other non-encryption technique) and optionally signed with an encryption key in step 4 of Figure 1, all of which may be accomplished through techniques well known in the art. Alternatively, a hashing function could be performed upon the token and the result used as a digital signature appended to the printed document. The proper decryption, de-obfuscation or signature verification is subsequently performed by the user's computer decoding software to confirm that a licensed party generated the token. The token is then converted to an ASCII string in step 5 which is then converted to the standard syntax of a machine readable code in step 6 such as OCR text, a linear barcode, a two dimensional barcode (e.g. PDF417 as discussed in detail in United States Patent Number 5,399,846 which is hereby incorporated by reference) or Magnetic Ink Character Recognition (MICR) encodation. The machine readable code is

then rendered as a component of the printed document 102 in step 7. The printed document 102 is then ready for distribution and circulation.

The next step of the process takes place in the user's computer 104 which is equipped with a bar code scanning device, such as a wand 105, which is adapted to scan the machine readable code in accordance with techniques well known in the art. The user computer 104 then decodes the data from the wand 105 via a decoder 107, and utilizes a stored decryption key to decrypt the data and verify its authenticity. A reading means in addition to the wand 105 may be chosen from any number of devices equipped to interface with peripherals capable of reading bar codes. In order to retrieve indexed information from the bar code, the bar code is scanned in step 8, either specifically by the wand 105 or in the process of digitally scanning the entire document via an optional page scanner 106.

The decoded ASCII string is then converted to a corresponding binary equivalent in step 9 and is decrypted, de-obfuscated or the signature of the string or its hash is verified to confirm generation by an authorized or licensed party in step 10 which results in a token. If the token thus derived is not valid as determined in step 10 the retrieval process is terminated in step 12.

However, if the token is valid, it is expanded to reconstruct the IP address and port, document and process values in step 13 which are required to retrieve the indexed

information from the target server. Usage and demographic information descriptive of the user computer 104 may optionally be retrieved from memory 108 and encrypted, obfuscated and signed in step 22 using a key 25 provided by a licensing party. The information resulting from step 21 is associated with the extracted IP address and port, document and process values from step 13, and then formatted using the syntax appropriate for an Internet communication session (e.g. WWW, html) thereby enabling a query to be asserted in step 14.

The query is transmitted onto the Internet by the user's web browser 110 in conjunction with an Internet communication module 112. After being routed to the target host computer 120 via standard Internet techniques, the query is unpacked and parsed by a communication module 122 and server 124 in step 15.

The target host computer 120 then activates the server file 124 which fetches the requested information from storage or generate the requested information using programmed retrieval and formatting processes (e.g. CGI, RDBM) in step 16. In one embodiment static preformatted information (e.g. html), RDBMS elements and CGI and RDBMS scripts are stored on a local host database 18, however, such information could also be stored on an appropriate device accessible through structured data communications with the host including the client. These transactions can also be logged in step 17 for subsequent analysis concerning traffic and reconciliation with licensing charges. The

retrieved or generated information is then formatted for transmission to the user computer 104 and transmitted using appropriate protocols (e.g. TCP/IP) in step 19. This information is then displayed to the user on the user computer 104 and a screen dialog between the user and the information system proceeds. A portion of the content or format of the information presented to the user could be tailored to the individual user based on demographic and usage information conveyed in the original query.

Alternatively, the query information, particularly the demographic and usage information, may be stored in the form of an activity log in step 23 on a separate server or as an activity database 24 on the host computer 120. In the case where the activity database 24 is stored on the host computer 120 the activity database 24 is encrypted and the information is retrieved for marketing or some other purpose in step 26, and decrypted in step 27 using the access key 25 which would generally be under the control of the licensing party and provided under commercial licensing terms. Following decryption this information could then be displayed or printed in step 29 or stored in step 28 for future analysis and use by the licensed publisher or vendor.

The classes of user computer devices that ay be used with the present invention include, but are not limited to, general purpose personal computers, workstations, handheld computers such as Personal Digital Assistants (PDA), network computers, intelligent display telephones (e.g. the "smart phone" commercially available through Phillips

Corporation),data communications capable set top boxes, or television receivers with integrated data communications capability (i.e. web-ready television).

CLAIMS:

1. In computer network comprising a user client computer and a target server computer, a method for automatically transferring a target data file from the target server computer to the client computer, said method comprising the steps of:

a) assembling a data string comprising a network address of said target server computer and a target file index pointer, said target file index pointer associated with said target data file to be transferred from said target server computer;

b) encrypting said data string utilizing an encryption key;

c) generating a printed document comprising a machine readable symbol, said machine readable symbol being encoded with said encrypted data string;

d) scanning said machine readable symbol with scanning means coupled to said client computer to produce a scanned data string;

e) producing a decrypted data string by decrypting said scanned data string with a key stored on said client computer and associated with said encryption key;

f) processing said decrypted data string to decode said target server computer network address and target file index pointer;

g) assembling a data request message for transmission over the computer network, said data message comprising said target file index pointer and user-specific data from a memory associated with said client computer, said data

request message being prepended with said target server computer network address in accordance with a transmission protocol associated with said computer network;

h) transmitting said data request message over said computer network;

i) receiving said data request message at said target server computer;

j) unpacking said data request message to determine said target file index pointer;

k) retrieving from memory said target file associated with said target file index pointer;

i) assembling a data return message for transmission over the computer network, said data return message comprising said target file and being prepended with a computer network address associated with said client computer;

l) transmitting said data return message over the computer network; and

m) receiving said data return message at said client computer.

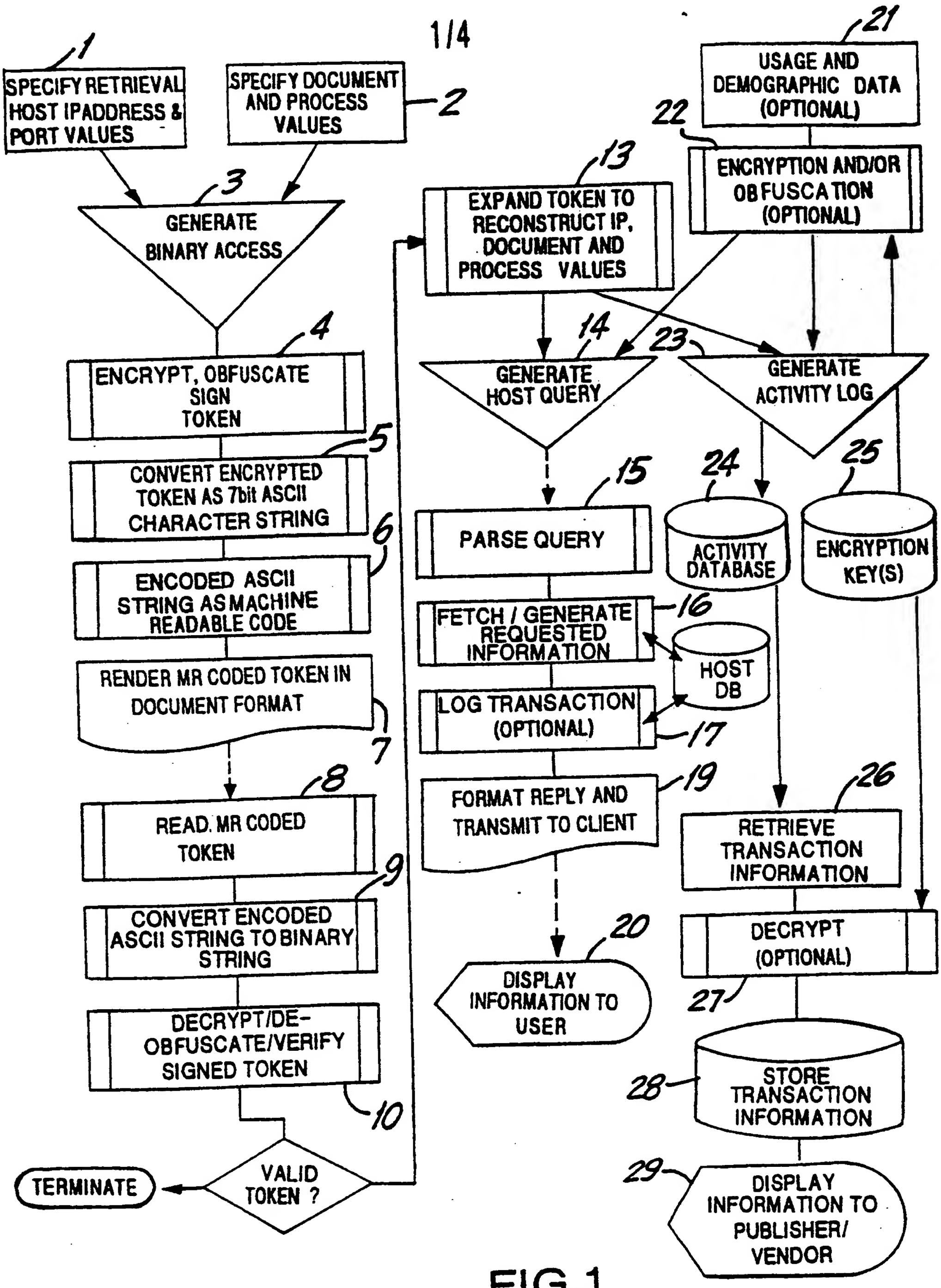
1
SPECIFY RETRIEVAL HOST IPADDRESS & PORT VALUES
2
SPECIFY DOCUMENT AND PROCESS VALUES
3
GENERATE BINARY ACCESS
4
ENCRYPT, OBFUSCATE SIGN TOKEN
5
CONVERT ENCRYPTED TOKEN AS 7bit ASCII CHARACTER STRING
6
ENCODED ASCII STRING AS MACHINE READABLE CODE
RENDER MR CODED TOKEN IN DOCUMENT FORMAT
7
8
READ MR CODED TOKEN
9
CONVERT ENCODED ASCII STRING TO BINARY STRING
DECRYPT/DE-OBFUSCATE/VERIFY SIGNED TOKEN
10
VALID TOKEN ?
TERMINATE
21
USAGE AND DEMOGRAPHIC DATA (OPTIONAL)
22
ENCRYPTION AND/OR OBFUSCATION (OPTIONAL)
13
EXPAND TOKEN TO RECONSTRUCT IP, DOCUMENT AND PROCESS VALUES
14
GENERATE HOST QUERY
23
GENERATE ACTIVITY LOG
15
PARSE QUERY
24
ACTIVITY DATABASE
25
ENCRYPTION KEY(S)
16
FETCH / GENERATE REQUESTED INFORMATION
HOST DB
LOG TRANSACTION (OPTIONAL)
17
19
FORMAT REPLY AND TRANSMIT TO CLIENT
26
RETRIEVE TRANSACTION INFORMATION
20
DISPLAY INFORMATION TO USER
DECRYPT (OPTIONAL)
27
28
STORE TRANSACTION INFORMATION
29
DISPLAY INFORMATION TO PUBLISHER/ VENDOR

FIG.1

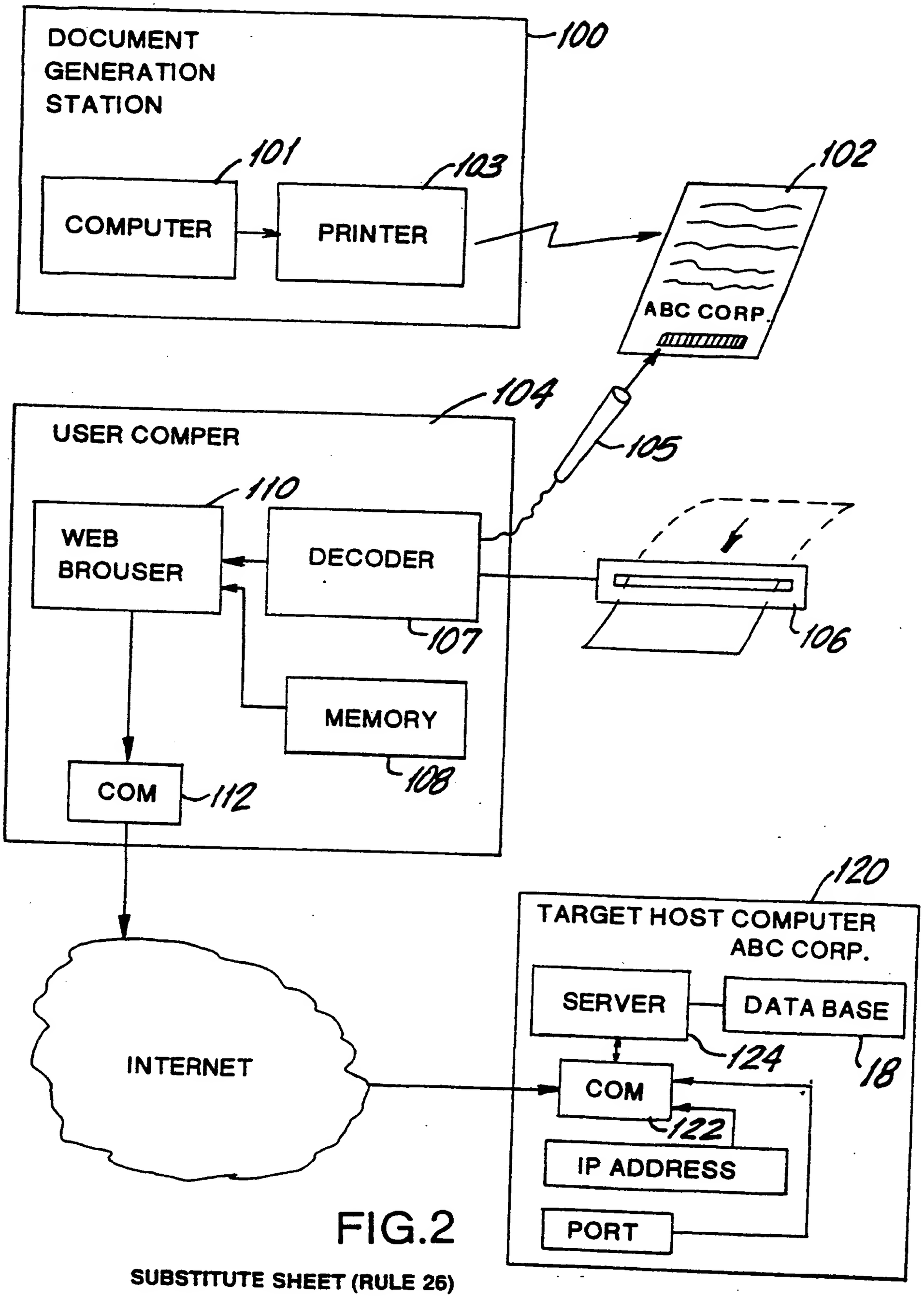
DOCUMENT GENERATION STATION
100
101
103
102
COMPUTER
PRINTER
ABC CORP.
104
USER COMPER
105
110
WEB BROUSER
DECODER
107
106
MEMORY
108
COM
112
120
TARGET HOST COMPUTER ABC CORP.
SERVER
DATA BASE
124
18
COM
122
IP ADDRESS
PORT
INTERNET

FIG.2

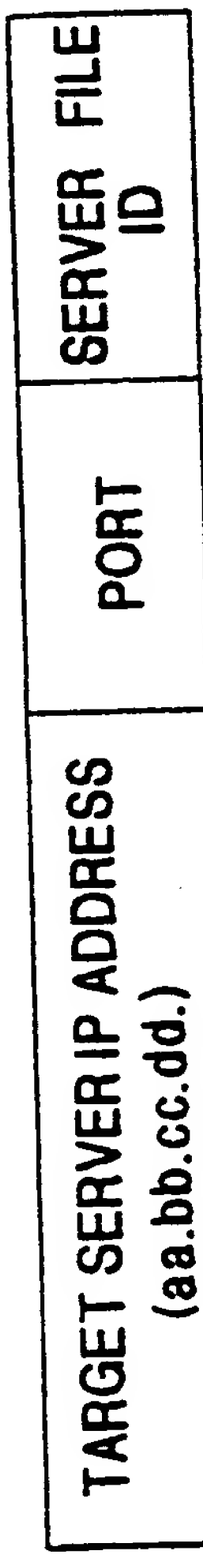

FIG.3

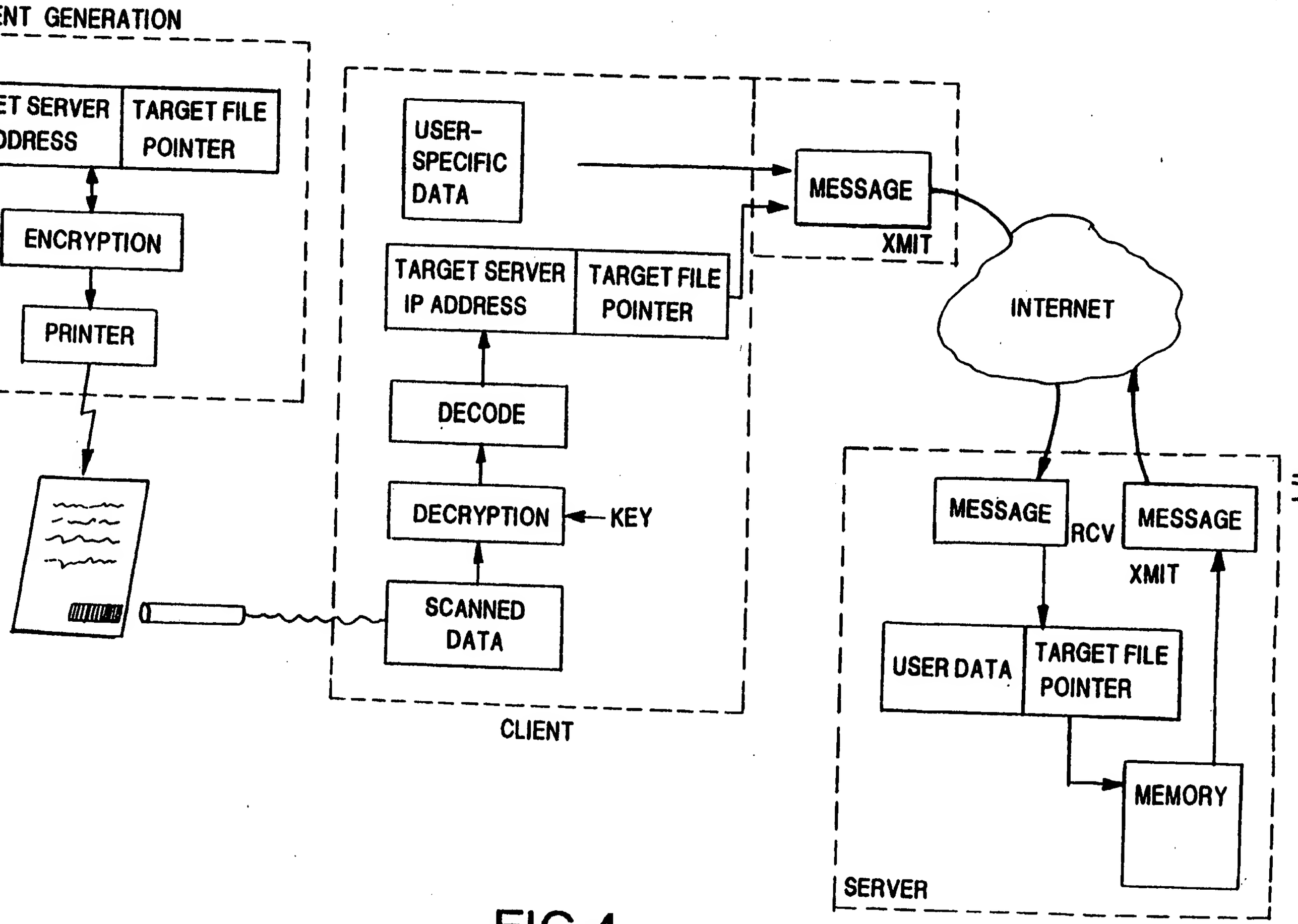

FIG.4

PCT/US98/02716